

REMARKS

Applicants wish to point out that claims 9-10, 13-14, 17-18, 21-22 are still pending in this application and have been unaddressed in this office action.

The examiner has rejected claims 29-31 under 35 U.S.C. 102 over Yew et al. Applicants respectfully assert that this ground of rejection has been overcome.

The claims have been amended to exclude polyimides, and fluorinated and non-fluorinated poly(arylene ethers) as members of the Markush Group of organic dielectrics. No prior art reference of record shows an organic layer on a substrate and an inorganic layer on the organic layer wherein the organic layer is a member of the remaining Markush Group members.

The present invention relates to the formation of low dielectric constant intermetal dielectrics. The invention claims a dielectric coated substrate which comprises a first dielectric composition film on a surface of a substrate; and a second dielectric composition film on the first dielectric composition film. The first dielectric composition and the second dielectric composition have substantially different etch resistance. Also, either the first dielectric composition film is organic and the second dielectric composition film is inorganic; or the first dielectric composition film is inorganic and the second dielectric composition film is organic. The organic dielectric film and the inorganic dielectric film, respectively, comprise the particular materials described in the claims.

Yew et al. relates also to multilevel interconnects for integrated circuits. The examiner is of the position that Yew et al. anticipates the teachings of the presently claimed invention. However, Applicants respectfully urge that Yew et al. fails to teach every aspect of the claimed invention, as amended. Indeed, Yew et al. may teach integrated circuit including a substrate having an inorganic dielectric layer and an organic dielectric layer disposed thereon. However, Yew et al. *fails to teach* the structure as

claimed by the present invention, wherein the organic layer is a member of the remaining Markush Group members. It is submitted that the absence of this feature of the present invention from the cited reference renders the present invention patentably distinct from Yew et al. It is therefore respectfully urged that the 35 U.S.C. 102 rejection has been overcome and should be withdrawn.

The examiner has rejected claims 23-25 and 28-30 under 35 U.S.C. 103 over Havemann et al. in view of Zhao. The examiner is of the position that Havemann et al. teaches each aspect of the presently claimed invention except for an organic dielectric layer which is selected from the group consisting of polyimides or polyarylene ethers. Thus, the examiner cites Zhao et al. for supposedly teaching such materials.

However, Applicants respectfully urge that this ground of rejection has been overcome. The claims have been amended to exclude polyimides, and fluorinated and non-fluorinated poly(arylene ethers) as members of the Markush Group of organic dielectrics. No prior art reference of record shows an organic layer on a substrate and an inorganic layer on the organic layer wherein the organic layer is a member of the remaining Markush Group members.

Neither Havemann et al. nor Zhao teach the structure of the presently claimed invention, particularly a substrate with an organic layer adjacent to an inorganic layer wherein the organic layer is a member of the remaining Markush Group members.

Zhao teaches a patterned and etched silicon dioxide or low-k dielectric on a substrate that is filled with metal to form contacts. A cap layer is then formed on the metal and dielectric material. The cap layer may be a silicon nitride or silicon dioxide. In comparing the structure of Zhao and Applicants' structure, it may be assumed that layer 306 on the substrate 302 of Zhao is analogous to Applicants' first dielectric layer on the substrate, and that the cap layer 308 of Zhao is analogous to Applicants' second dielectric layer. When this comparison is made, the Zhao structure is not the same as that taught by Applicants. Particularly, Zhao's cap layer 308 is not an inorganic material selected from

the group described in claim 29. Rather, cap layer 308 is only described as a silicon nitride layer or a silicon dioxide. This is an important and distinguishing limitation of the claimed invention that is not described by Zhao.

The examiner is of the position that Zhao describes a structure wherein layer 316 represents an organic layer on a substrate and between the metal lines and wherein layer 310 represents an inorganic layer of Applicants' materials on the organic layer. Applicants' respectfully submit that such is incorrect. Layer 316 of Zhao is not located on a surface of the substrate as required by the present claims. Furthermore, Zhao et al. do not teach an organic layer on a surface of the substrate and an inorganic layer on the organic layer which inorganic or organic layer comprises a dielectric selected from the group described in claim 29.

Even should one consider Zhao cap layer 318 as analogous to Applicants' substrate, Zhao still fails to teach or suggest the claimed invention. Particularly, while Zhao's layer 316 is described as a low-k dielectric layer which may comprise an organic material, Zhao et al. does not describe that next layer 312 may comprise an inorganic dielectric selected from the group consisting of those materials required in claim 29. Rather, layer 312 is described solely as materials such as silicon dioxide, silicon oxynitride, aluminum oxide, silicon carbide and the like. Additionally, layer 312 is not described as a material formed of the same dielectric materials used to form low-k dielectrics 310 or 316. In fact, the list of materials suitable for forming layer 312 include some very different materials than those used to describe the other specified low dielectric constant materials by Zhao. This further emphasizes the fact that layer 312 is not described or suggested as comprising hydrogensiloxanes or hydrogensilsesquioxanes having said criteria.

For the foregoing reasons, it is urged that there is *no* teaching or suggestion in either reference which would lead one skilled in the art to combine Havemann et al. and Zhao et al. in an effort to devise the presently claimed invention. For these same reasons it is further submitted that the combination of Havemann et al. and Zhao et al. would still fail

to obviate the present claims. Applicants therefore respectfully request that the 35 U.S.C. 103 rejection be withdrawn.

The examiner has rejected claims 23-31 under 35 U.S.C. 103 over Havemann et al. in view of Zhao and in further view of Yew et al. Applicants respectfully submit that this ground of rejection should be withdrawn. None of the prior art references show an organic layer on a substrate and an inorganic layer on the organic layer wherein the organic layer is a member of the remaining Markush Group members.

The examiner asserts that the combination of Havemann et al. and Zhao teaches each aspect of the presently claimed invention except for the silsesquioxane comprising hydrogensilsesquioxanes having a formula as claimed by the present invention. Thus, the examiner cites Yew et al. for supposedly teaching this feature. Applicants respectfully submit that this is not the case.

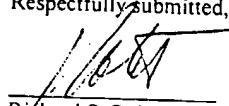
The arguments against Havemann et al. in view of Zhao are repeated from above and apply equally here. Particularly, it is urged that neither of these references teaches or suggests the structure as taught by the presently claimed invention. Furthermore, the arguments against Yew et al. are repeated from above.

Indeed various other features of the present invention may be taught by one or more of these cited references. However, in forming the instant rejection, the examiner then leaps to the conclusion that, in effect, all features of the present invention are prima facie obvious. This is certainly not the case. Applicants submit that there is no teaching or suggestion in Havemann et al., Zhao, or Yew et al. which would inspire one skilled in the art to combine these references. Furthermore, even if read in combination, the teachings of these references *still* fail to obviate the claimed invention, for reasons stated above. It is therefore respectfully requested that the 35 U.S.C. 103 rejection be withdrawn.

The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there

is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,


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